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NTC ORLANDO
5090.3a

BASE REALIGNMENT AND CLOSURE ENVIRONMENTAL SITE SCREENING REPORT FOR STUDY AREA 45 NTC ORLANDO FL

5/1/1997

ABB ENVIRONMENTAL

BASE REALIGNMENT AND CLOSURE ENVIRONMENTAL SITE SCREENING REPORT

STUDY AREA 45

NAVAL TRAINING CENTER ORLANDO, FLORIDA

UNIT IDENTIFICATION CODE: N65928
CONTRACT NO.: N62467-89-D-0317/107

MAY 1997

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

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BASE REALIGNMENT AND CLOSURE
ENVIRONMENTAL SITE SCREENING REPORT

STUDY AREA 45

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Unit Identification Code: N65928

Contract No. N62467-89-D-0317/107

Prepared by:

ABB Environmental Services, Inc.
2590 Executive Center Circle, East
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Prepared for:

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Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29418

Barbara Nwokike, Code 1873, Engineer-in-Charge

May 1997

CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/107 are complete and accurate and comply with all requirements of this contract.

DATE: May 28, 1997

NAME AND TITLE OF CERTIFYING OFFICIAL: John Kaiser
Task Order Manager

NAME AND TITLE OF CERTIFYING OFFICIAL: Richard Allen
Project Technical Lead

(DFAR 252.227-7036)

TABLE OF CONTENTS

BRAC Environmental Site Screening Report
Study Area 45
Naval Training Center
Orlando, Florida

LIST OF FIGURES

BRAC Environmental Site Screening Report
Study Area 45
Naval Training Center
Orlando, Florida

GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
bls	below land surface
CLP	Contract Laboratory program
DQO	data quality objective
FDEP	Florida Department of Environmental Protection
GPR	ground penetrating radar
MAG	magnetometer
mg/ℓ	milligrams per liter
µg/ℓ	micrograms per liter
mg/kg	milligrams per kilogram
RBC	risk-based concentration
SA	site assessment
TAL	target analyte list
TCL	target compound list
TDMD	time domain metal detector
USEPA	U.S. Environmental Protection Agency

1.0 STUDY AREA 45, MAIN BASE, ALLEGED DISPOSAL AREA NEAR BUILDING 125

1.1 STUDY AREA 45, BACKGROUND AND CONDITIONS. This report contains information gathered as a result of site screening activities conducted at Study Area (SA) 45. SA 45 is located near the small arms magazine in the southeastern portion of the Main Base (Figures 1 and 2). A large grassy area surrounds the magazine. This SA was described in the Technical Memorandum, Air Force Records Search (ABB-ES, 1995a). In that document, ABB-ES interviewed electric shop personnel who reported observations of small bottles and shingles in this area during excavation activities. Further details can be found in the Site Screening Plan, Former Air Force Sites, Addendum 2 (ABB-ES, 1995b).

1.2 STUDY AREA 45 INVESTIGATION SUMMARY. Site screening activities were carried out at SA 45 to evaluate specific environmental concerns associated with alleged disposal activities near Building 125.

1.2.1 Geophysical Survey A geophysical survey was conducted at SA 45 between January 15 and February 9, 1996. The various techniques included magnetometry (MAG), time domain metal detector (TDMD), and ground penetrating radar (GPR). The magnetic method is a versatile geophysical technique used for locating buried debris by mapping local distortions in the earth's magnetic field produced by buried magnetic objects (steel and other magnetic materials). A total of 208 magnetometer measurements were acquired during the investigation.

A TDMD survey was conducted in the SA via a series of parallel east-west traverses separated at 10-foot intervals. Data were acquired along each traverse at the rate of 1.60 readings per foot (one reading every 19 centimeters). Approximately 7,000 lineal feet of coverage with more than 11,000 readings were acquired during the investigation. The TDMD is designed to map buried conductive objects, such as metal tanks, drums, and utilities.

A GPR survey was completed to evaluate MAG/TDMD anomalies mapped during the magnetometer and TDMD investigations. The GPR technique is effective in mapping buried utilities and delineating the boundaries of buried hazardous waste materials and abandoned landfills.

The details of the geophysical surveys are included as Appendix A.

1.2.2 Subsurface Soil Samples Three subsurface soil samples were collected at the locations of three soil borings advanced in SA 45. Samples were collected just above the water table at depths that varied from 2 to 3 feet below land surface (bls). These samples were submitted for full suite Contract Laboratory program (CLP) target compound list (TCL) and target analyte list (TAL) analyses in accordance with U.S. Environmental Protection Agency (USEPA) Level IV data quality objectives (DQOs).

1.2.3 Soil Boring Investigation and Temporary Monitoring Well Installation Three soil borings were advanced to a depth of from 5.4 to 9 feet bls using a bucket hand auger. The soil boring locations were situated near geophysical anomalies or where potential impact to groundwater from past site activities

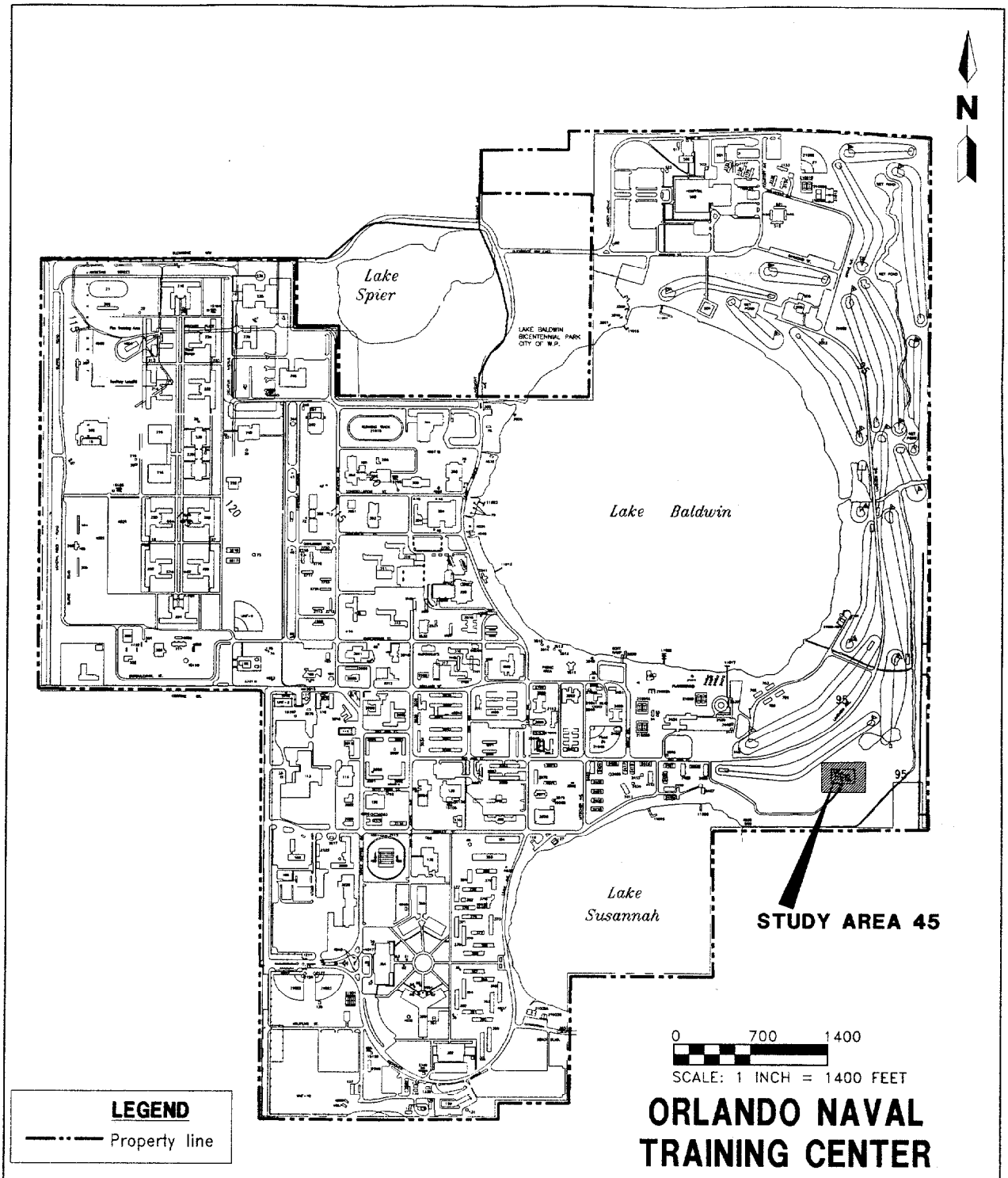

FIGURE 1
LOCATION OF STUDY AREA 45

H:\OLD\AREA-45.DWG, NP 05/20/97 11:38:59, AutoCAD R12

BASE REALIGNMENT AND CLOSURE ENVIRONMENTAL SITE SCREENING REPORT, STUDY AREA 45 NAVAL TRAINING CENTER ORLANDO, FLORIDA

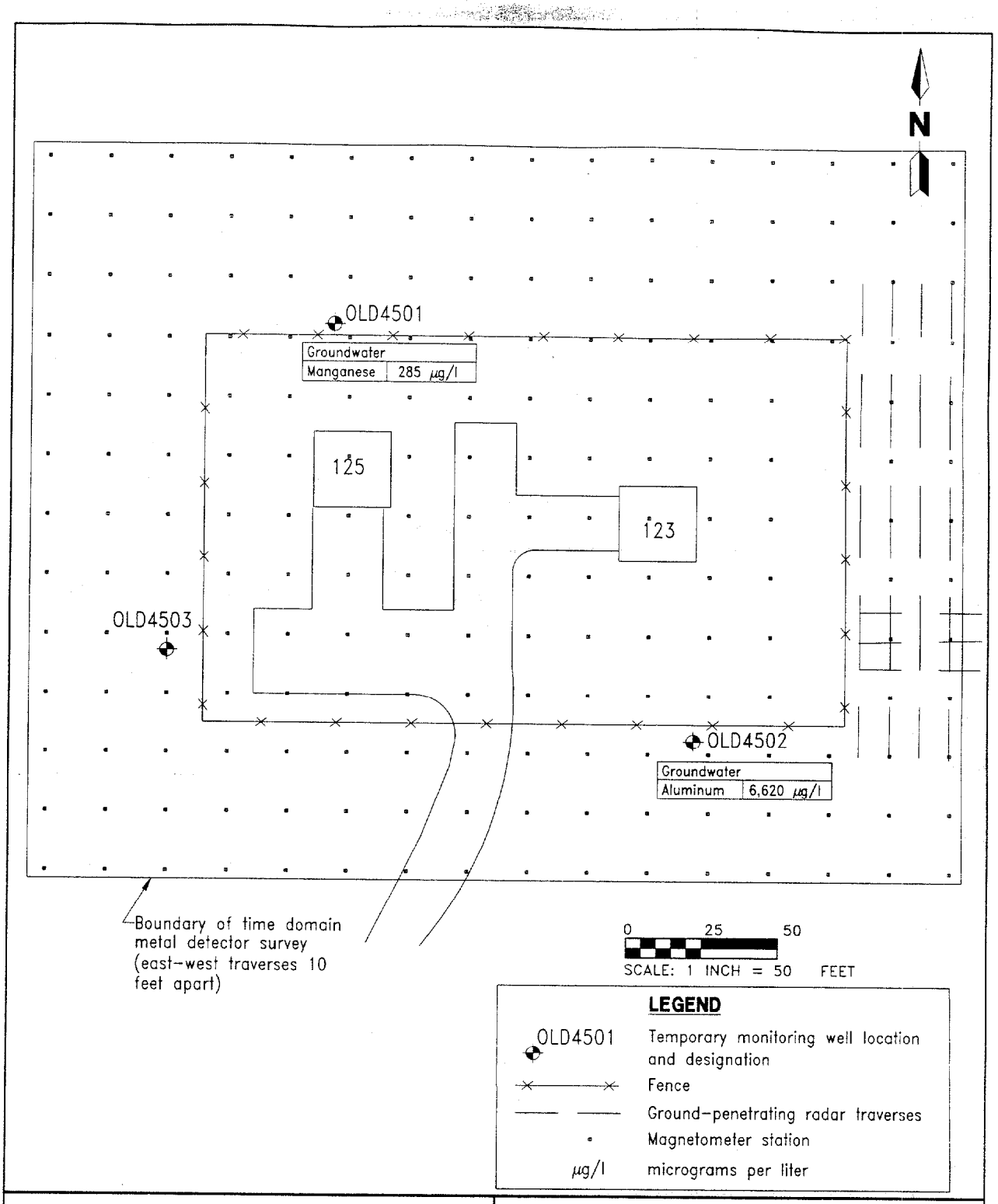

FIGURE 2
STUDY AREA 45
GEOPHYSICAL SURVEYS, SOIL BORINGS, AND TEMPORARY MONITORING WELL LOCATIONS, MCCOY ANNEX, ALLEGED DISPOSAL AREA NEAR BUILDING 125

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BASE REALIGNMENT AND CLOSURE ENVIRONMENTAL SITE SCREENING REPORT, STUDY AREA 45 NAVAL TRAINING CENTER ORLANDO, FLORIDA

could be assessed. The local groundwater flow direction was to the south, based on leveling data collected at the three soil borings. During drilling operations, no flame ionization detector readings above background were observed.

Temporary monitoring wells were completed in each hand-augered soil boring. Each boring was advanced 3 to 4 feet below the water table. A slotted 2-inch-diameter well screen was lowered into the boring, and the annular space was filled with filter sand. After purging, both unfiltered ("G" designation) and filtered ("H" designation) groundwater samples were collected using the low-flow technique. The well screen was then withdrawn and the boring backfilled with granular bentonite.

Soil boring logs, temporary monitoring well installation diagrams, and groundwater sample field data are included in Appendix B.

1.3 STUDY AREA 45, RESULTS. The results of site screening investigations at SA 45 are discussed below. Analytical results from the subsurface soil and groundwater collected from SA 45 are presented in Appendix C (Table C-1, Summary of Detections in Subsurface Soil Analytical Results; and C-2, Summary of Detections in Groundwater Analytical Results). A complete set of analytical results for these media is presented in Appendix D (Table D-1, Summary of Subsurface Soil Analytical Results; and Table D-2, Summary of Groundwater Analytical Results). There were no exceedances of regulatory guidance concentrations.

1.3.1 Subsurface Soil As noted in Section 1.1, former base personnel reported observations of small bottles and shingles during excavation activities within SA 45. In addition, the soil boring logs for borings OLD-45-01 and OLD-45-03 indicate the presence of construction debris (burnt wood and asphalt shingles).

1.3.1.1 Inorganics Subsurface soil analytical results for SA 45 do not appear to indicate significant inorganic contamination. However, several metals exceed their respective background screening levels, likely reflecting a different source of soil material. Sample 45B00301 had beryllium at a concentration of 0.14B (reported concentration is between the instrument detection limit and Contract Required Detection Limit) milligrams per kilogram (mg/kg) versus a Region III risk-based concentration (RBC) of 0.15 mg/kg. No other metals had concentrations approaching their respective RBCs.

1.3.1.2 Organics Several organic compounds were reported, including xylene and several semivolatile organics. The xylene in sample 45B00201 is interpreted to be a laboratory artifact, whereas the semivolatiles reported in Sample 45B00101 are of very low concentrations when compared with their respective RBCs. The presence of these compounds is likely due to the presence of burnt construction materials noted in the soil boring log. Leachability-based soil cleanup goal values do not apply, as no organic compounds were present in groundwater above Florida Department of Environmental Protection (FDEP) groundwater guidance concentrations (see Subsection 1.3.2, below).

1.3.2 Groundwater Groundwater at SA 45 does not appear to have been impacted by past site activities, although aluminum and manganese were detected in groundwater at concentrations exceeding background screening values and the FDEP groundwater guidance concentration. However, aluminum and manganese are

secondary standards (color, odor) and are not believed to present health risks at the observed concentrations.

Secondary standards have been established for Class G-I and G-II aquifers by the State of Florida, largely along Federal guidelines, to ensure that groundwater meets at least minimum criteria for taste, odor, and color, and does not pose a health risk.

Based on records reviews and interviews, there have been no known site activities that may have contributed to the observed exceedances of secondary standards for aluminum and manganese observed in wells OLD-45-02 and OLD-45-01, respectively, although the boring log for OLD-45-01 noted a 1-foot zone from 1.5 to 2.5 feet bls containing construction debris, burned wood, and asphalt shingles. The reported aluminum concentration in well OLD-45-02 was 6,620 micrograms per liter ($\mu g/\ell$) versus a background screening concentration of 4,067 $\mu g/\ell$. The filtered sample from OLD-45-02 had an aluminum concentration of 1,610 $\mu g/\ell$. The concentration for manganese in well OLD-45-01 was 285 $\mu g/\ell$ versus a Florida secondary standard of 50 $\mu g/\ell$. The manganese concentration in the filtered sample from well OLD-45-01 did not decrease significantly. Subsurface soil concentrations of aluminum and manganese did not exceed residential RBCs. The groundwater samples were only slightly turbid (6 to 19 nephelometric turbidity units) and total suspended solids ranged from 5 to 86 milligrams per liter (mg/ℓ), suggesting a weak correlation at best between suspended solids and observed secondary standard exceedances.

Analytes exceeding Florida secondary standards should also be compared with RBCs for tapwater published by the USEPA, Region III. The tapwater guidance concentrations for aluminum and manganese are 37,000 and 840 $\mu g/\ell$, respectively. There were no other TAL metals exceedances, and other groundwater parameters measured during sampling were within normal limits: pH varied from 4.86 to 6.57, temperature from 71 to 75 degrees Fahrenheit, and conductivity from 458 to 1190 micromhos per centimeter. ABB Environmental Services, Inc. (ABB-ES) concludes that the aluminum and manganese exceeding secondary standards are naturally occurring, are not related to past site activities, and do not pose a risk to human health or the environment.

1.4 STUDY AREA 45, CONCLUSIONS AND RECOMMENDATIONS. ABB-ES has concluded that the subsurface soils and groundwater at SA 45 have received minimal or no impact from past site activities. However, future users of this property should be aware that the presence of aluminum and manganese in groundwater at the measured concentrations may render the surficial aquifer objectionable as a potable or irrigation water source. Future users should also be aware that construction debris has been noted in the shallow subsurface soils. Based on information available and evaluation of the site screening data for this study area, ABB-ES recommends the following:

- a classification of 1/White for SA 45, because evidence indicates that no storage, release, or disposal of hazardous substances or petroleum products has occurred, including no migration of these substances from adjacent areas;

- SA 45 is suitable for transfer with no further requirement for evaluation.

The undersigned members of the Base Realignment and Closure Cleanup Team concur with the findings and recommendations of the preceding investigation.

STUDY AREA 45

U.S. Environmental Protection Agency, Region IV	Date 6/19/97
Florida Department of Environmental Protection	Date 6-19-97
U.S. Department of the Navy	Date 6-19-97

REFERENCES

ABB Environmental Services, Inc. (ABB-ES). 1995a. *Technical Memorandum, U.S. Air Force Records Search*. Naval Training Center (NTC), Orlando, Florida. Prepared for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), North Charleston, South Carolina.

ABB-ES. 1995b. *Site Screening Plan, Air Force Sites, Addendum 2*. Naval Training Center (NTC), Orlando, Florida. Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina.

APPENDIX A

GEOPHYSICAL SURVEY RESULTS

TECHNICAL MEMORANDUM
GEOPHYSICAL SURVEYS
STUDY AREA 45

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

INTRODUCTION. Geophysical surveys were conducted at Study Area (SA) 45 in the southeast portion of the Main Base of the Naval Training Center, Orlando. The objective for the survey was to evaluate the nature and extent of potential landfilling activities that may have taken place in this area.

Geophysical techniques employed during this survey included magnetometry (MAG), time domain metal detector (TDMD), and ground penetrating radar (GPR). Figure 1 shows the area of investigation and outlines the approximate boundaries of each of the geophysical surveys.

The field program was conducted between January 15 and February 9, 1996.

PERSONNEL. ABB Environmental Services, Inc. (ABB-ES) personnel involved in the field program included William Olson, Geologist; Marc Hawes, Associate Geologist; Robert Burns, Associate Engineer; and John Nash, Geologist. Greg Mudd was the Field Operations Lead during the investigation. Overall direction for the field program was provided by Richard Allen, Principal Scientist and Project Technical Lead.

FIELD PROGRAM.

MAGNETOMETER SURVEY. Prior to the start of the field program, ABB-ES established a grid coordinate system in the study area. The grid coordinate system was oriented along magnetic north and consisted of a 100- by 100-foot grid established over the survey area with a cloth measuring tape and transit. The magnetometer survey was conducted between January 15 and January 26, 1996. The instrumentation consisted of an EDA OmniPlus proton precession magnetometer with vertical gradient capability. The survey was conducted on a 20- by 20-foot measurement grid.

The magnetic method is a versatile geophysical technique used for evaluating shallow geologic structures and for locating buried manmade objects and buried debris by mapping local distortions in the earth's magnetic field produced by buried magnetic objects (steel and other magnetic materials). Vertical gradient measurements are very useful in mapping the lateral extent of landfilled materials, because nearly all landfills contain sufficient ferrous materials to be mapped with this technique. Vertical gradient measurements of the earth's magnetic field are often taken during environmental magnetic surveys, as they are more sensitive to the presence of near-surface metal objects than total field values alone.

A total of 208 magnetometer measurements were acquired during the investigation.

TIME DOMAIN METAL DETECTOR SURVEY. A TDMD survey was conducted over SA 45 between January 20 and January 26, 1996. The survey consisted of a series of parallel east-west traverses separated at 10-foot intervals. Data were acquired

along each traverse at the rate of 1.60 readings per foot (one reading every 19 centimeters). More than 7,000 lineal feet of profiling was completed, with more than 11,000 data points. The instrumentation consisted of a Geonics EM-61 TDMD with high capacity Polycorder data logger.

The EM-61 TDMD was designed to map buried conductive objects, such as metal tanks, drums, and utilities. The instrument incorporates an antenna system consisting of a transmitter and receiver. The transmitter produces a series of electromagnetic (EM) wavelets that pulse into the earth 75 times per second. After each pulse, a secondary EM field is produced briefly from moderately conductive shallow soils and for a longer period of time from buried metallic objects. Between primary EM pulses, a time delay is imposed upon the data logger to permit the secondary response from the soils to dissipate prior to the somewhat later and longer response from any buried metal that is present. The receiver senses the secondary responses from metallic objects, and they are recorded by the data logger.

There is an upper and a lower coil (Channel [1] and Channel [2], respectively, on the data output) on the EM-61 TDMD. The lower coil is more sensitive to shallow buried objects. Results may be presented as vertical gradient contours, or the difference in readings between the upper and lower coils, a dimensionless parameter. The gradient values minimize the effects of near surface metallic materials. Thus, theoretically, a contour map of the lower coil (Channel [2]) would map shallow metallic objects, whereas the vertical gradient contours would tend to emphasize the presence of relatively deeper metallic objects.

GROUND PENETRATING RADAR SURVEY. A GPR survey was conducted at SA 45 on February 9, 1996. The purpose for this work was to evaluate MAG/TDMD anomalies that were mapped during those investigations. The instrumentation consisted of a GSSI SIR 3 radar system equipped with a 500 MHz antenna.

The GPR technique uses high frequency radio waves to determine the presence of subsurface objects and structures. The radio wave energy is reflected from surfaces where there is a contrast in the electrical properties of subsurface materials, such as naturally occurring geologic horizons or manmade objects (e.g., buried utilities, tanks, drums). Typical applications for GPR include mapping buried utilities and delineating the boundaries of buried hazardous waste materials and abandoned landfills.

RESULTS.

MAGNETOMETER SURVEY. Figure 1 presents the locations for all MAG measurements made in SA 45. They were taken on a 20- by 20-foot measurement grid. The results of the magnetometer survey are presented as vertical gradient contours, Figure 2, at a contour interval of 10 gammas per meter.

As anticipated during the site walkover prior to the start of the geophysical survey, the survey area contained cultural features that produced significant distortion in the magnetic data. Such features include buried utilities, light poles, vehicles, fencing, buildings, and overhead power lines. Accordingly, only those portions of the study area sufficiently distant from these surface and buried sources of magnetic interference can be used to reliably assess the presence or absence of landfilled materials and potential contaminant sources.

Magnetic disturbances from cultural features rendered some of the data collected during this investigation unusable for evaluation.

Figure 2 indicates that much of the area of investigation has anomalous magnetic disturbances, but most of the disturbances can be explained by cultural features observed at the surface (fencing, overhead power lines, and steel reinforcing rod in concrete structures). There were several magnetic disturbances that could not be explained by correlation with surface features. These disturbances were chosen for further investigation with GPR (Section 4.4, below).

TIME DOMAIN METAL DETECTOR SURVEY. The results of the TDMD survey for SA 45 are discussed below.

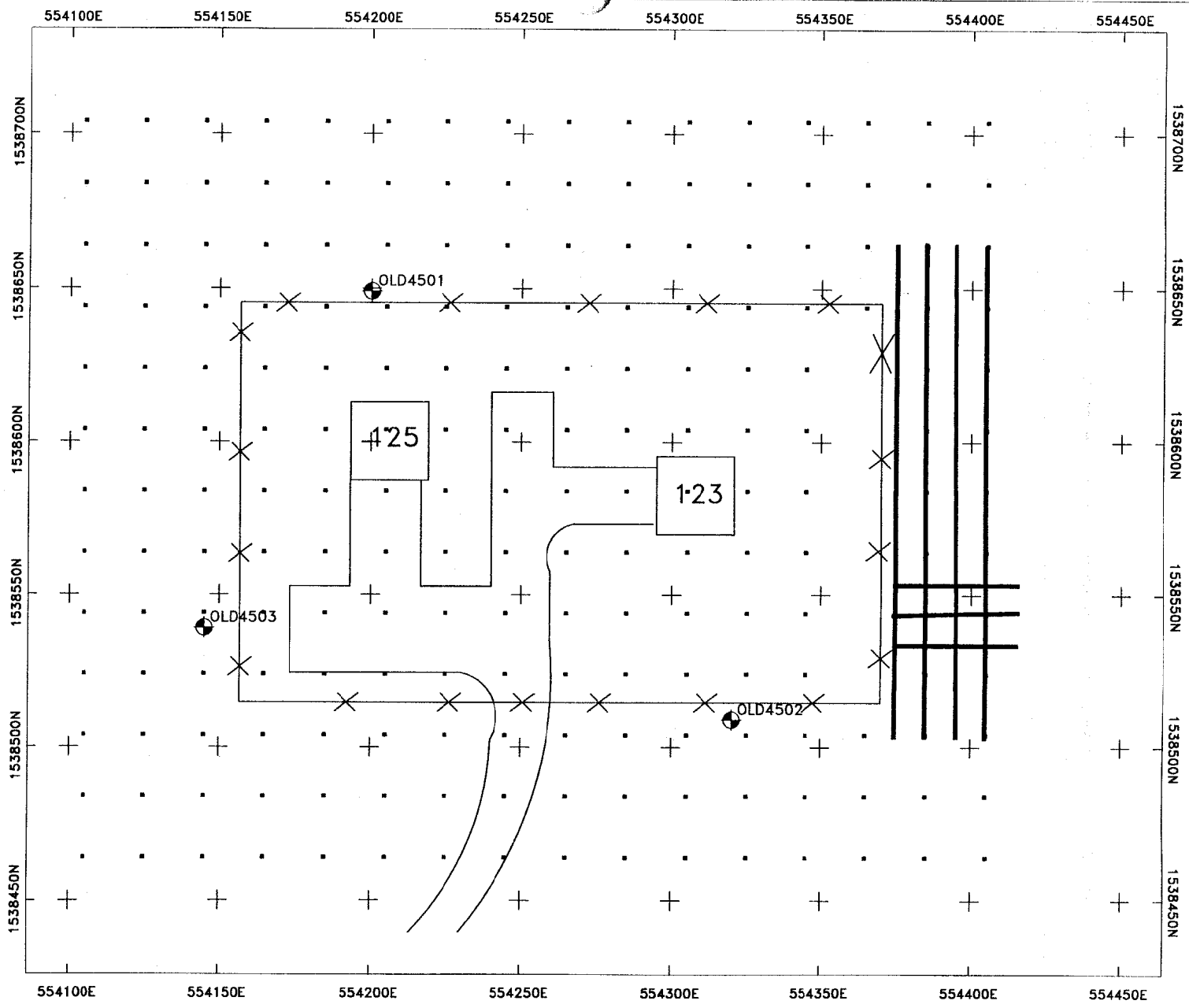
The TDMD contours (Figure 3) present the vertical gradient between the upper and lower coils of the instrument. The data indicate that much of the area inside the chain-link fence is subject to interference from cultural features, such as fencing, steel reinforcing wire in concrete, and overhead power lines. East of the fenced enclosure, however, there is an area of anomalous TDMD contours that was chosen for further investigation with GPR.

GROUND PENETRATING RADAR SURVEY. The results of the GPR survey for SA 45 are discussed below.

GPR traverses were completed along 7 traverses indicated on Figure 1. The data were generally of good to excellent quality. Some of the most salient features noted in the data include the fill surface underlying the parking lot in which historical accounts indicate that subsidence had taken place requiring that fill be brought in to repair the surface. No GPR anomalies were mapped that were indicative of potential sources of environmental concern.

CONCLUSIONS. As anticipated, interference from cultural objects limited the effectiveness of the MAG and TDMD data in assessing subsurface conditions in some portions of SA 45.

Geophysical data aided in evaluating subsurface conditions and in siting soil borings completed as temporary monitoring wells.



GPR TRAVERSES

MAGNETOMETER STATION

Scale 1:600

25 0 25 50

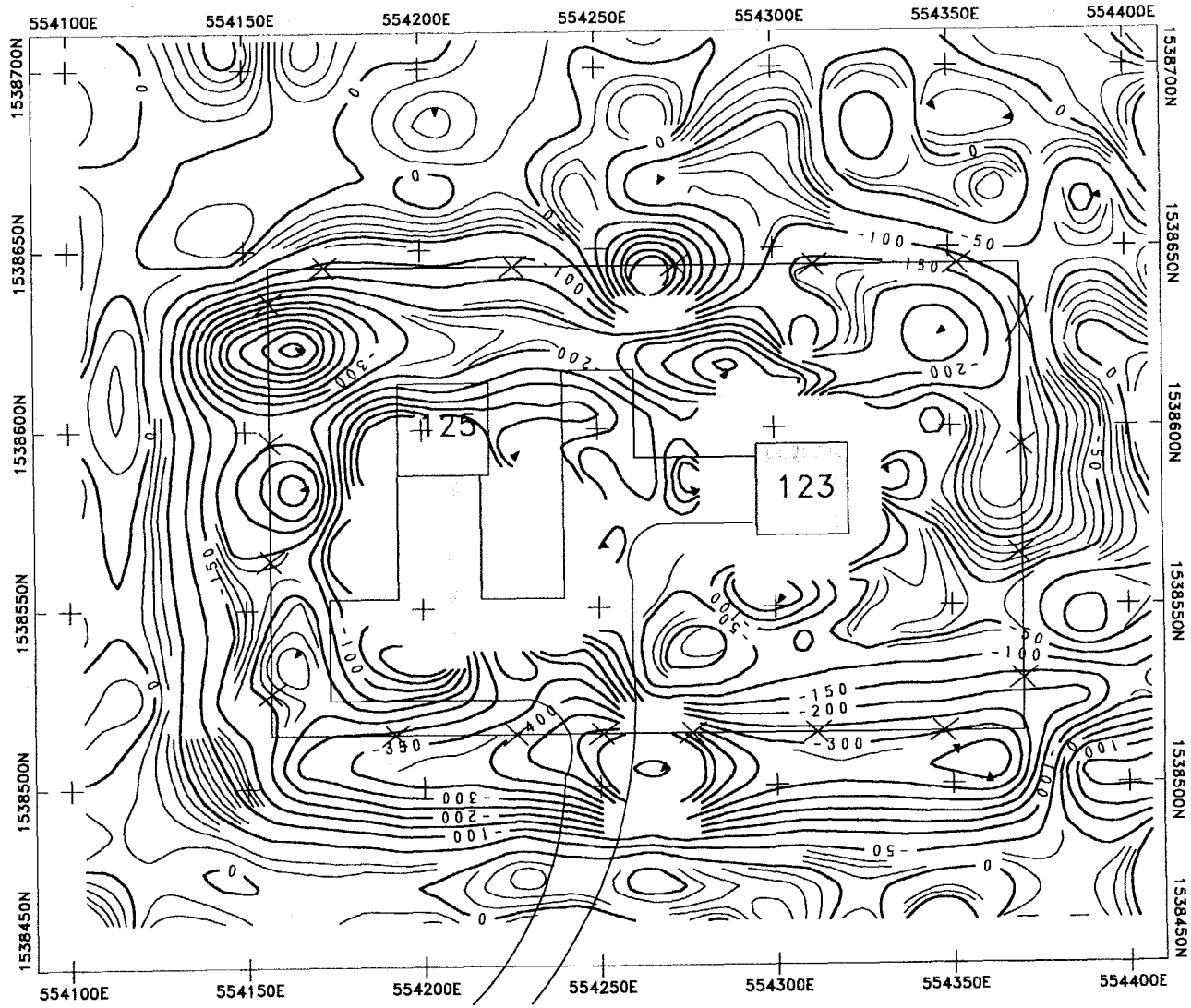
(feet)

FIGURE 1

SOUTHERN DIVISION

STUDY AREA 45
SITE MAP OF ALL EXPLORATIONS

ABB ENVIRONMENTAL SERVICES, INC.



Scale 1:600

25 0 25 50

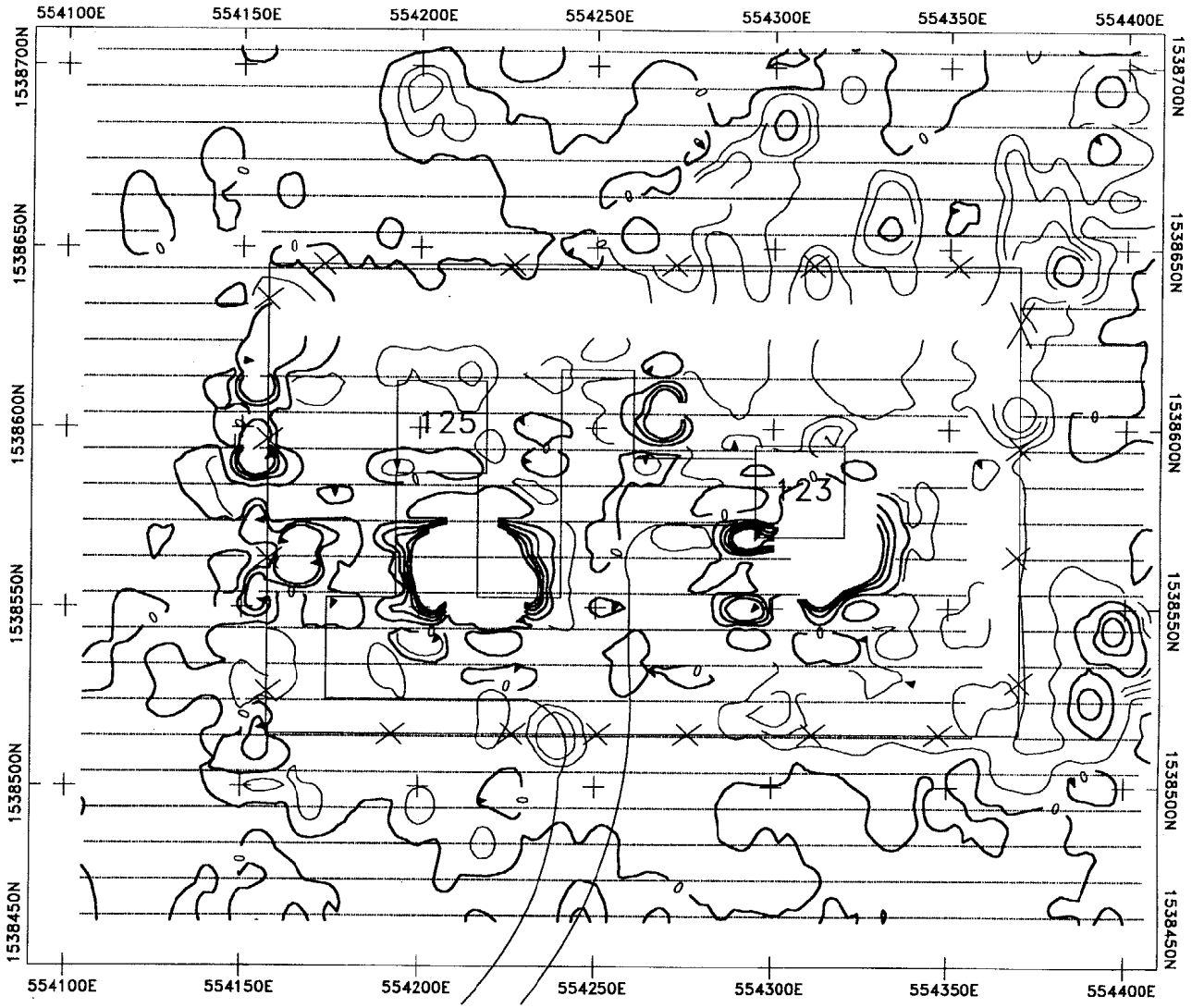
(feet)

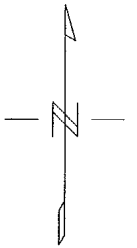
FIGURE 2

SOUTHERN DIVISION

GEOPHYSICAL SURVEY
STUDY AREA 45
VERTICAL GRADIENT CONTOURS

ABB ENVIRONMENTAL SERVICES, INC.





Scale 1:600

25 0 25 50

(feet)

FIGURE 3

SOUTHERN DIVISION
GEOPHYSICAL SURVEY TIME DOMAIN METAL DETECTOR CONTOURS CHANNEL 4 (VERTICAL GRADIENT)
ABB ENVIRONMENTAL SERVICES, INC.

APPENDIX B

SOIL BORING LOGS, TEMPORARY MONITORING WELL INSTALLATION DIAGRAMS, AND GROUNDWATER SAMPLE FIELD DATA

Project: BRAC, NTC Orlando	**Well ID:** S.A. 45		**Boring ID:** OLD-45-01
Client: SOUTHDIVNAVFACENGCOM	**Contractor:** ABB-ES		**Job No.:** 08519.10
Northing:	**Easting:**	**Date started:** 03/27/96	**Complid:** 03/27/96
Method: Hand Auger	**Casing dia.:** 4"	**Screened int.:** 5 ft.	**Protection level:** D
TOC elev.: NTC Orlando Ft.	**Type of OVM.:** Porta FID II	**Total dpth:** 5.4Ft.	**Dpth to** ▽ 3.0 Ft.
ABB Rep.: WDO	**Well development date:** PVC		**Site:**

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diag.
					Silty fine SAND, dark brown, with plant roots		SM	0	
					Silty SAND, dark gray, construction debris - burnt wood, asphalt shingles			0	
					Fine SAND, gray		SP	0	
	45B00101 3-4' CLP				Silty SAND, dark brown		SM	0	▽
5								0	
					Boring terminated at 5.4 feet bls				
10									

 ABB ENVIRONMENTAL SERVICES, INC.

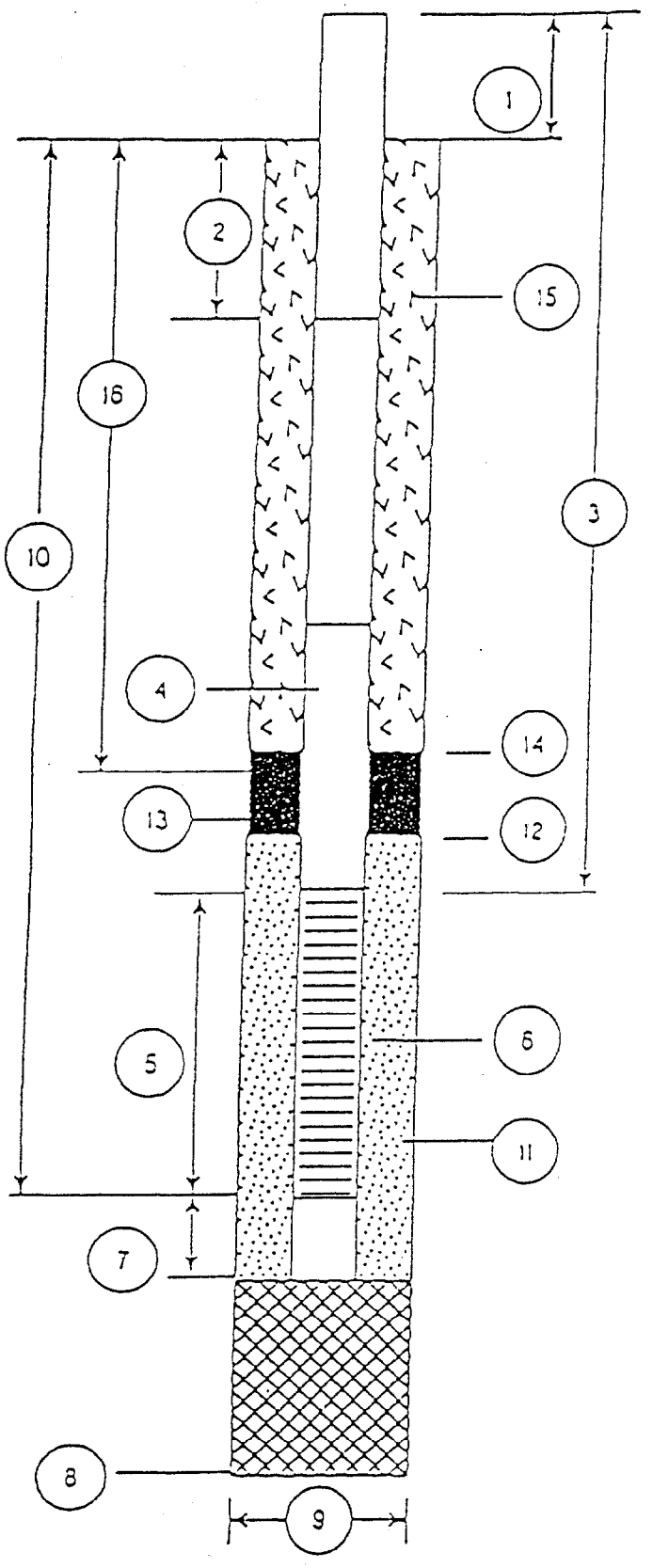
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.

WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-45-OL

DATE OF INSTALLATION: 3-27-9



1. Height of Casing above ground: 2"
2. Depth to first Coupling: NA
   Coupling Interval Depths: NA
3. Total Length of Riser Pipe: none
4. Type of Riser Pipe: none
5. Length of Screen: 5'
6. Type of Screen: 2" sched 40 PVC 0.010"
7. Length of Sump: 6"
8. Total Depth of Boring: 5'4"
9. Diameter of Boring: 4"
10. Depth to Bottom of Screen: 4'10"
11. Type of Screen Filter: #0 silica sand
    Quantity Used: 25 lb Size: 20/3
12. Depth to Top of Filter: 0'
13. Type of Seal: NA
    Quantity Used: NA
14. Depth to Top of Seal: NA
15. Type of Grout: NA
    Grout Mixture: NA
    Method of Placement: NA
16. Tot. Depth of 6 in. Steel Casing: NA

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 08519.10
Sample Location ID: OLD-H5-01 (TW)
Time: Start: 0832 End: 0931
Point of Interest: SA 45
Date: 3-28/96
Signature of Sampler: [signature]

Water Level/Well Data

Well Depth 5.43 Ft. — X Measured / ___ Historical
X Top of Well / ___ Top of Protective Casing
Well Riser Stick-up (from ground) NA Ft.
Protective Casing/Well Difference NH Ft.
Protective Casing NA Ft.

Depth to Water 2.31 Ft.
Well Material: X PVC / ___ SS
Well Locked?: X Yes / ___ No
Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch
Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Pressl. Transducer

Height of Water Column 3.12 Ft. X ✓ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ ___ Gal/Ft. (___ in.) = [0.5 Gal/Vol; 3.5 Total Gal Purged]

Well Integrity: Yes / No
Prot. Casing Secure: NA
Concrete Collar Intact: NA
Other rempwell

Equipment Documentation

Purging/Sampling Equipment Used :

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
—	—	Submersible Pump	
—	—	Bailer	
—	—	PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
—	—	Airlift	
—	—	Hand Pump	
—	X	In-line Filter	
—	—	Press/Vac Filter	
—	—		

Decontamination Fluids Used :

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
X Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None
___ ___
___ ___

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line X In Container
Sample Observations: ___ Turbid X Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 2.5 Gal.	@ 2.75 Gal.	@ 3.0 Gal.	@ 3.25 Gal.	@ 3.5 Gal.
Temperature, Deg. C	21.5	21.5	21.5	21.5	21.5
pH, units	6.58	6.58	6.59	6.58	6.57
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	1190	1010	1200	1200	1190
Oxidation - Reduction, +/- mv					
~~Dissolved Oxygen, ppm~~ TURB NTU	12.46	10.10	10.20	9.80	8.40

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	3x40ml	✓	___/___/___/___
SVOA	___	4°C	2 2	✓ ✓	___/___/___/___
Pest/PCB	___	4°C	2 2	✓ ✓	___/___/___/___
Inorganics	✓	HNO_3	1L / 1L	✓ ✓	___/___/___/___
~~Explosives~~ TSS	___	4°C	500 ml	✓	___/___/___/___
TPH	___	H_2SO_4		—	___/___/___/___
TOC	___	H_2SO_4		—	___/___/___/___
Nitrate	___	H_2SO_4		—	___/___/___/___

Notes: ___

Project: BRAC, NTC Orlando	**Well ID:** S.A. 45		**Boring ID:** OLD-45-02
Client: SOUTHDIVNAVFACENGCOM	**Contractor:** ABB-ES		**Job No.:** 08519.10
Northing:	**Easting:**	**Date started:** 03/27/96	**Complt'd:** 03/27/96
Method: Hand Auger	**Casing dia.:** 4"	**Screened int.:** 5 ft.	**Protection level:** D
TOC elev.: NTC Orlando Ft.	**Type of OVM.:** Porta FID II	**Total dpth:** 9.0Ft.	**Dpth to** ▽ 4.18 Ft.
ABB Rep.: WDO	**Well development date:** PVC		**Site:**

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diag.
					Silty SAND, dark brown		SM		
					Fine SAND, gray, rocky debris		SP	0	
					Silty SAND, black		SM		
	45B00201 2-3' CLP							0	
								0	
								0	
								0	
								0	▽
5								0	
								0	
								0	
								0	
					Boring terminated at 9.0 feet bls				
10									

 ABB ENVIRONMENTAL SERVICES, INC.

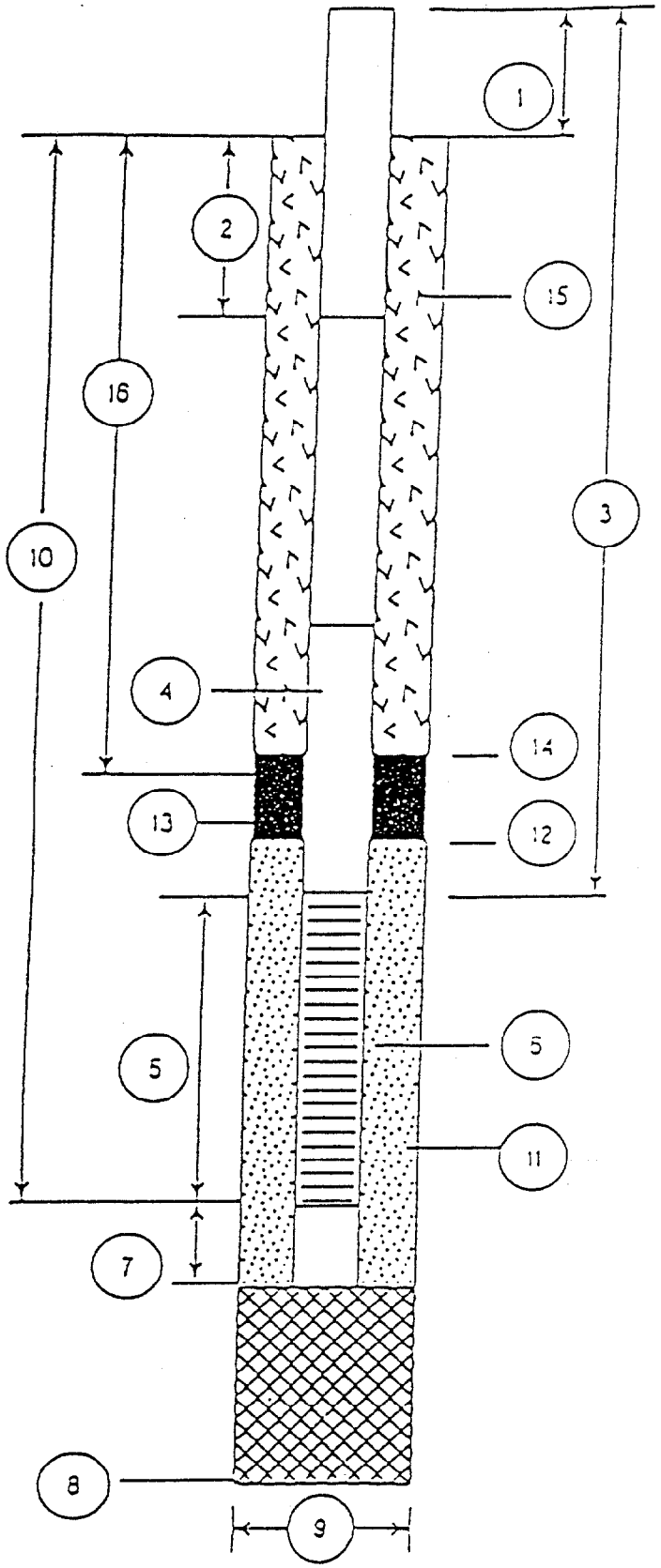
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.

WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-45-02

DATE OF INSTALLATION: 3-27-



1. Height of Casing above ground: 1.54
2. Depth to first Coupling: 3.46
   Coupling Interval Depths: NA
3. Total Length of Riser Pipe: 5'
4. Type of Riser Pipe: 2" sched 40 PVC
5. Length of Screen: 5'
6. Type of Screen: 2" sched 40 PVC 0.010 slot
7. Length of Sump: 6"
8. Total Depth of Boring: 9'
9. Diameter of Boring: 4"
10. Depth to Bottom of Screen: 8.46
11. Type of Screen Filter: Silica Sand
    Quantity Used: 40lb Size: 20/30
12. Depth to Top of Filter: Ø
13. Type of Seal: NA
    Quantity Used: NA
14. Depth to Top of Seal: NA
15. Type of Grout: NA
    Grout Mixture: NA
    Method of Placement: NA
16. Tot. Depth of 6 in. Steel Casing: NA

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 08519.10
Sample Location ID: OLD-45-02 (TW)
Time: Start: 1038 End: 1130
Point of Interest: SA45
Date: 3-28/96
Signature of Sampler: M. Hobson D. Olson

Water Level/Well Data

Well Depth 10.34 Ft. — X Measured / ___ Historical
X Top of Well / ___ Top of Protective Casing
Well Riser Stick-up (from ground) 1.54 Ft.
Protective Casing/Well Difference NA Ft.
Protective Casing NA Ft.

Depth to Water 5.75 Ft.
Well Material: X PVC / ___ SS / ___
Well Locked?: X Yes / ___ No
Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch / ___
Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer / ___

Height of Water Column 4.59 Ft. X
√ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ ___ Gal/Ft. (___ in.)
= 0.73 Gal/Vol
5 gal Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: NA / ___
Concrete Collar Intact: NA / ___
Other TEMP WELL: ___ / ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
—	—	Submersible Pump	
—	—	Bailer	
—	—	PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
—	—	Airlift	
—	—	Hand Pump	
—	X	In-line Filter	
—	—	Press/Vac Filter	
—	—		

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
X Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None
___ ___
___ ___

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm
Field Data Collected: ___ In-line / X In Container
Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ 3.75 Gal.	@ 4.0 Gal.	@ 4.5 Gal.	@ 4.75 Gal.	@ 5.0 Gal.
Temperature, Deg. C	24.0	24.0	24.0	24.0	24.0
pH, units	4.93	4.90	4.88	4.87	4.86
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	452	466	459	452	458
Oxidation - Reduction, +/- mv					
~~Dissolved Oxygen, ppm~~ TURB, NTU	14.37	10.76	9.20	6.72	5.59

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	3x40ml	√	___/___/___/___
SVOA	___	4OC	2L	√	___/___/___/___
Pest/PCB	___	4OC	2L	√	___/___/___/___
Inorganics	√	HNO_3	1L/1L	√	___/___/___/___
Explosives TSS	___	4°C	500ml	√	___/___/___/___
TPH	___	H_2SO_4		___	___/___/___/___
TOC	___	H_2SO_4		___	___/___/___/___
Nitrate	___	H_2SO_4		___	___/___/___/___

Notes: ___

Project: BRAC, NTC Orlando	**Well ID:** S.A. 45		**Boring ID:** OLD-45-03
Client: SOUTHDIVNAVFACENGCOM	**Contractor:** ABB-ES		**Job No.:** 08519.10
Northing:	**Easting:**	**Date started:** 03/27/96	**Complid:** 03/27/96
Method: Hand Auger	**Casing dia.:** 4"	**Screened int.:** 5 ft.	**Protection level:** D
TOC elev.: NTC Orlando Ft.	**Type of OVM.:** Porta FID II	**Total dpth:** 6.4Ft.	**Dpth to** ▽ 3.61 Ft.
ABB Rep.: WDO	**Well development date:** PVC		**Site:**

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diag.
					Silty SAND, dark brown with roots, some construction debris		SM	0	
								0	
					Clayey SILT, black, cohesive		MH	0	
	45B00301 2.5-3.5' CLP				Silty SAND, brown		SM	0	▽
5								0	
								0	
					Boring terminated at 6.4 feet bls				
10									

 ABB ENVIRONMENTAL SERVICES, INC.

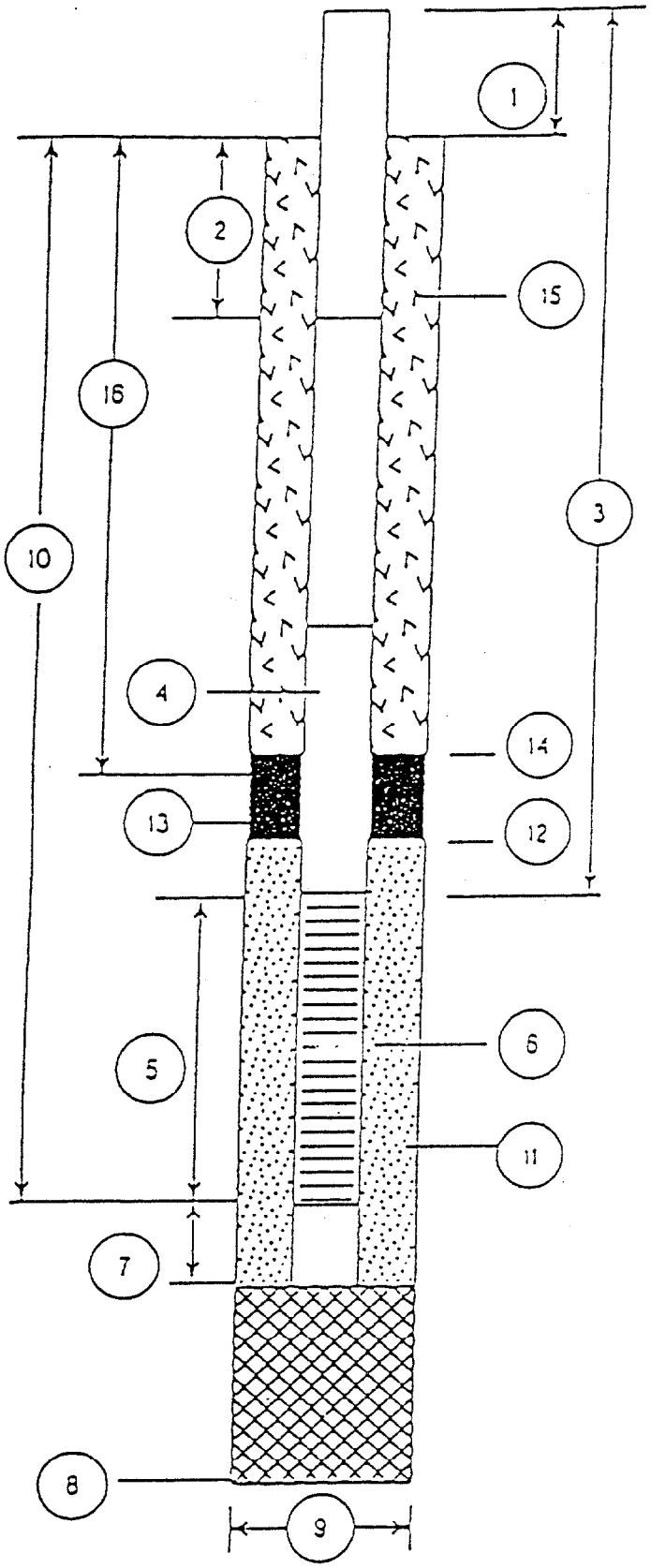
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.

WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-45-03

DATE OF INSTALLATION: 3-24



1. Height of Casing above ground: 4.18
2. Depth to first Coupling: 0.82'
   Coupling Interval Depths: NA
3. Total Length of Riser Pipe: 5'
4. Type of Riser Pipe: 2" sched 40 PVC
5. Length of Screen: 5'
6. Type of Screen: 2" sched 40 PVC 0.010slo
7. Length of Sump: 6"
8. Total Depth of Boring: ~~4'~~ 6.4'
9. Diameter of Boring: 4"
10. Depth to Bottom of Screen: 5.82
11. Type of Screen Filter: Silica sand
    Quantity Used: 3516 Size: 20
12. Depth to Top of Filter: Ø
13. Type of Seal: NA
    Quantity Used: NA
14. Depth to Top of Seal: NA
15. Type of Grout: NA
    Grout Mixture: NA
    Method of Placement: NA
16. Tot. Depth of 6 in. Steel Casing: NA

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 08519.10
Sample Location ID: OLD-45-03 (TW)
Time: Start: 1255 End: 1347
Point of Interest: SA 45
Date: 3-28/96
Signature of Sampler: Walter D. Olson

Water Level/Well Data

Well Depth 10.46 Ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing
Well Riser Stick-up (from ground) 4.18 Ft.
Protective Casing/Well Difference NA Ft.
Protective Casing NA Ft.

Depth to Water 8.09 Ft.
Well Material: X PVC / ___ SS
Well Locked?: X Yes / ___ No
Well Dia.: X 2 inch / ___ 4 inch / ___ 6 inch
Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 2.37 Ft. X √ .16 Gal/R. (2 in.) / ___ .65 Gal/R. (4 in.) / ___ 1.5 Gal/R. (6 in.) / ___ ___ Gal/R. (___ in.) = [0.38 Gal/Vol] [4 Total Gal Purged]

Well Integrity: Yes / No
Prot. Casing Secure: NA
Concrete Collar Intact: NA
Other TEMP WELL

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
—	—	Submersible Pump	
—	—	Bailer	
—	—	PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
—	—	Airlift	
—	—	Hand Pump	
—	X	In-line Filter	
—	—	Press/Vac Filter	
—	—		
—	—		

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
X Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None
___ ___
___ ___

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line / X In Container
Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ 3.00 Gal.	@ 3.25 Gal.	@ 3.5 Gal.	@ 3.75 Gal.	@ 4 Gal.
Temperature, Deg. C	25.0	25.0	24.0	24.0	24.0
pH, units	5.93	6.01	6.00	6.00	5.99
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	315	312	320	310	318
Oxidation - Reduction, +/- mv					
~~Dissolved Oxygen, ppm~~ TURB, NTU	22.6	17.41	10.45	13.46	8.20

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	3X40ml	√	___/___/___/___
SVOA	___	4°C	2L	√	___/___/___/___
Pest/PCB	___	4°C	2L	√	___/___/___/___
Inorganics	√	HNO_3,	1L/1L	√	___/___/___/___
~~Explosives~~ TSS	___	4°C	500ml	√	___/___/___/___
TPH	___	H_2SO_4		___	___/___/___/___
TOC	___	H_2SO_4		___	___/___/___/___
Nitrate	___	H_2SO_4		___	___/___/___/___

Notes: ___

APPENDIX C

SUMMARY OF DETECTIONS IN SOIL AND GROUNDWATER ANALYTICAL RESULTS

C-1: Summary of Detections in Subsurface Soil Analytical Results
C-2: Summary of Detections in Groundwater Analytical Results

APPENDIX C-1

SUMMARY OF DETECTIONS IN SUBSURFACE SOIL ANALYTICAL RESULTS

Table C-1. Summary of Positive Detections in Subsurface Soil Analytical Results

Site Screening, Study Area 45
Naval Training Center, Orlando
Orlando, FL

Sample ID	Background Screening[1]		SCG [2] Leaching		RBC [3] for Residential Soil		RBC [3] for Industrial Soil		45B00101		45B00201		45B00301	
Lab ID									MA587002		MA587003		MA587004	
Sampling Date									3/27/96		3/27/96		3/27/96	
Depth, ft bls									3-4		2-3		2.5-3	
Volatile Organics, ug/kg														
Xylene (total)			NA		160,000,000	n	1,000,000,000	n			2	J		
Semivolatile organics, ug/kg														
Benzo(a)anthracene									59	J				
Benzo(a)pyrene									63	J				
Benzo(b)fluoranthene			NA		880	c	7,800	c	58	J				
Benzo(k)fluoranthene			NA		8,800	c	78,000	c	60	J				
bis(2-Ethylhexyl)phthalate			NA		46,000	c	410,000	c	2000					
Chrysene			NA		88,000	c	780,000	c	67	J				
Dl-n-butylphthalate			NA		7,800,000	n	200,000,000	n	230	J				
Fluoranthene			NA		3,100,000	n	82,000,000	n	69	J				
Pyrene			NA		23,000,000	n	610,000,000	n	42	J				
Inorganics, mg/kg														
Aluminum	2119		NC		78,000	n	1,000,000	n	593		1840	J	2120	
Arsenic	1.1		NA		0.43 /23	c/n	3.8 /610	c/n			0.34	B	0.39	J
Barium	3.6		NA		5,500	n	140,000	n	5.4	J	5.8	J	12.1	J
Beryllium			NA		0.15	c	1.3	c					0.14	B
Calcium	115		NA		1,000,000		1,000,000		1860	J	4280	J	7070	J
Chromium	3.7		NA		390	n	10,000	n	1.8	B	1.5	B	2.5	B
Copper			NA		3,100	n	82,000	n	4.6	B	1.7	B	3.1	B
Iron	264		NA		23,000	n	610,000	n	72.3		325		75.9	
Lead	3.9		NA		400		400		4	J	3.7	J	4.5	J
Magnesium	32.8		NA		460,468		460,468		63.2	B	42.4	B	101	B
Manganese	2.1		NC		1,800	n	47,000	n	7.1		2.6	B	1.8	B
Nickel			NA		1,600	n	41,000	n	4.1	B				
Selenium	1.3		NA		390	n	10,000	n			0.69	J	1.4	
Vanadium	3.4		NA		550	n	14,000	n	1	B	2.4	B	7.9	B

Table C-1. Summary of Positive Detections in Subsurface Soil Analytical Results

Site Screening, Study Area 45
Naval Training Center, Orlando
Orlando, FL

NOTES:

[1] The background screening value is twice the average of detected concentrations for inorganic analytes.

[2] SCG = Soil Cleanup Goals for Florida (Florida Department of Environmental Protection memorandum, September 29, 1995). Leachability-based SCGs are not applicable for most metals (except aluminum and manganese) because groundwater standards were not exceeded.

[3] RBC = Risk-Based Concentration Table, USEPA Region III, May, 1996, R.L. Smith. RBC for chromium is based on chromium VI. RBC for lead is not available, value is Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER directive 9355-4-12). For essential nutrients (calcium, magnesium) screening values were derived based on recommended daily allowances (RDAs).

n = noncarcinogenic pathway
c = carcinogenic pathway
feet bls = feet below land surface
ug/kg = micrograms per kilogram.
mg/kg = milligrams per kilogram.
NA = not applicable
NC = not calculated

All inorganics results expressed in milligrams per kilogram (mg/kg) soil dry weight; organics in micrograms per kilogram (ug/kg) soil dry weight.
B = Reported concentration is between the instrument detection limit (IDL) and Contract Required Detection Limit (CRDL).
J = Reported concentration is an estimated quantity.
Blank cell in sample results indicate that the analyte or compound has not been detected at the reporting limit.
Bold/shaded values indicate exceedance of regulatory guidance and background.

APPENDIX C-2

SUMMARY OF DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS

Table C-2. Summary of Positive Detections in Groundwater Analytical Results

Site Screening, Study Area 45
Naval Training Center, Orlando
Orlando, FL

Well ID					OLD-45-01		OLD-45-02		OLD-45-03	
Sample_ID	Background [1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	45G00101	45H00101	45G00201	45H00201	45G00301	45H00301
Sampling Date					3/28/96	3/28/96	3/28/96	3/28/96	3/28/96	3/28/96
Inorganics, ug/L										
Aluminum	4,067	200 [3]	ND	37,000 n	204 J	194 J	6620 J	1610 J	566 J	568 J
Antimony	4.1	6 [5]	6	15 n		5.6				
Arsenic	5	50 [4]	50	0.045/11 c/n					2.4 B	3
Barium	31.4	2,000 [5]	2,000	2,600 n	43.1 J	40.2 J	36.5 J	34.2 J		
Beryllium		4 [5]	4	0.016 c			0.29 B			
Calcium	36,830	ND	ND	1,000,000	283000	280000	75200	89900	60700	59500
Copper	5.4	1,000 [3]	1,300 [6]	1,500 n		2.1 J				
Iron	1,227	300 [3]	ND	11,000 n			293	200 J		
Lead	4	15 [5]	15 [7]	15			2 J		2.4 J	
Magnesium	4,560	ND	ND	118,807	12600	12500	2210 B	2950 B	3530 B	3490 B
Manganese	17	50 [3]	ND	840 n	285 J	279 J	14.8 J	18.8 J	14.2 J	14.1 J
Potassium	5,400	ND	ND	297,016	1580 B	1890 B			2990 B	2530 B
Selenium	9.7	50 [5]	50	180 n			1.4 B			
Sodium	18,222	160,000 [5]	ND	396,022	6100 J	6040 J	1610 J	1900 J	1710 J	1800 J
Vanadium	20.6	49 [4]	ND	260 n	3.4 B	5.2 B	3.6 B		7.9 B	5.5 B
Volatile Organics, ug/L										
Bromomethane	ND	10 [4]	ND	8.7 n	2 J	NA		NA		NA
General Chemistry, mg/L				ND						
Total Suspended Solids	ND	ND	ND		5	NA	86	NA	10	NA

Table C-2. Summary of Positive Detections in Groundwater Analytical Results

Site Screening, Study Area 45
Naval Training Center, Orlando
Orlando, FL

NOTES:

[1] Groundwater background screening value is twice the average of detected concentrations for inorganic analytes.
[2] RBC = Risk-Based Concentration Table, USEPA Region III, May 1996, R.L. Smith. RBC for chromium is based on chromium VI. RBC for lead is not available, value is treatment technology action limit for lead in drinking water distribution system identified in Drinking Water Standards and Health Advisories (USEPA, 1995). For essential nutrients (calcium, magnesium, potassium, and sodium) screening values were derived based on recommended daily allowances (RDAs).
[3] Secondary Standard.
[4] Systemic Toxicant
[5] Primary Standard
[6] Value is preliminary action level.
[7] Treatment technique requirement. Value shown is the action level, to be measured at the tap. Value shown is the value to recommend as a preliminary cleanup goal.

n = noncarcinogenic effects.
c = carcinogenic effects.
ND = Not determined.
NA = Not analyzed.
ID = identifier.
USEPA = U.S. Environmental Protection Agency.
FDEPG = Florida Department of Environmental Protection, Groundwater Guidance Concentrations, June 1994.
FEDMCL= Federal Maximum Contaminant Levels, Primary Drinking Water Regulations and Health Advisories, October 1996.
B = Reported concentration is between the instrument detection limit (IDL) and the contract required detection limit (CRDL).
J = Reported concentration is an estimated quantity.
G = unfiltered water sample.
H = filtered water sample.
ug/l = micrograms per liter.
mg/l = miligrams per liter.
Bold/shaded numbers indicate exceedance of groundwater guidance and background. For essential nutrients (calcium, magnesium, potassium sodium), calculated RBCs are used for comparison.
Blank space indicates analyte/compound was not detected at the reporting limit.

APPENDIX D

SUMMARY OF ANALYTICAL RESULTS

D-1: Summary of Subsurface Soil Analytical Results
D-2: Summary of Groundwater Analytical Results

APPENDIX D-1

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS

Appendix D
Table D-1
Summary of Subsurface Soil Analytical Results
Study Area 45

Naval Training Center, Orlando
Orlando, FL

Sample ID	45B00101		45B00201		45B00301	
Lab ID	MA587002		MA587003		MA587004	
Sampling Date	27-Mar-96		27-Mar-96		27-Mar-96	
Volatile organics, ug/kg						
1,1,1-Trichloroethane	12	U	13	U	21	U
1,1,2,2-Tetrachloroethane	12	U	13	U	21	U
1,1,2-Trichloroethane	12	U	13	U	21	U
1,1-Dichloroethane	12	U	13	U	21	U
1,1-Dichloroethene	12	U	13	U	21	U
1,2-Dichloroethane	12	U	13	U	21	U
1,2-Dichloroethene (total)	12	U	13	U	21	U
1,2-Dichloropropane	12	U	13	U	21	U
2-Butanone	12	U	13	U	21	U
2-Hexanone	12	U	13	U	21	U
4-Methyl-2-pentanone	12	U	13	U	21	U
Acetone	12	U	13	U	21	U
Benzene	12	U	13	U	21	U
Bromodichloromethane	12	U	13	U	21	U
Bromoform	12	U	13	U	21	U
Bromomethane	12	U	13	U	21	U
Carbon disulfide	12	U	13	U	21	U
Carbon tetrachloride	12	U	13	U	21	U
Chlorobenzene	12	U	13	U	21	U
Chloroethane	12	U	13	U	21	U
Chloroform	12	U	13	U	21	U
Chloromethane	12	U	13	U	21	U
cis-1,3-Dichloropropene	12	U	13	U	21	U
Dibromochloromethane	12	U	13	U	21	U
Ethylbenzene	12	U	13	U	21	U
Methylene chloride	12	U	13	U	21	U
Styrene	12	U	13	U	21	U
Tetrachloroethene	12	U	13	U	21	U
Toluene	12	U	13	U	21	U
trans-1,3-Dichloropropene	12	U	13	U	21	U
Trichloroethene	12	U	13	U	21	U
Vinyl chloride	12	U	13	U	21	U
Xylene (total)	12	U	2	J	21	U
Semivolatile organics, ug/kg						
1,2,4-Trichlorobenzene	420	U	440	U	690	U
1,2-Dichlorobenzene	420	U	440	U	690	U
1,3-Dichlorobenzene	420	U	440	U	690	U
1,4-Dichlorobenzene	420	U	440	U	690	U
2,2'-oxybis(1-Chloropropane)	420	U	440	U	690	U
2,4,5-Trichlorophenol	1000	U	1100	U	1700	U
2,4,6-Trichlorophenol	420	U	440	U	690	U
2,4-Dichlorophenol	420	U	440	U	690	U
2,4-Dimethylphenol	420	U	440	U	690	U
2,4-Dinitrophenol	1000	U	1100	U	1700	U
2,4-Dinitrotoluene	420	U	440	U	690	U
2,6-Dinitrotoluene	420	U	440	U	690	U
2-Chloronaphthalene	420	U	440	U	690	U
2-Chlorophenol	420	U	440	U	690	U
2-Methylnaphthalene	420	U	440	U	690	U
2-Methylphenol	420	U	440	U	690	U
2-Nitroaniline	1000	U	1100	U	1700	U

Appendix D
Table D-1
Summary of Subsurface Soil Analytical Results
Study Area 45

Naval Training Center, Orlando
Orlando, FL

Sample ID	45B00101		45B00201		45B00301	
Lab ID	MA587002		MA587003		MA587004	
Sampling Date	27-Mar-96		27-Mar-96		27-Mar-96	
2-Nitrophenol	420	U	440	U	690	U
3,3'-Dichlorobenzidine	420	U	440	U	690	U
3-Nitroaniline	1000	U	1100	U	1700	U
4,6-Dinitro-2-methylphenol	1000	U	1100	U	1700	U
4-Bromophenyl-phenylether	420	U	440	U	690	U
4-Chloro-3-methylphenol	420	U	440	U	690	U
4-Chloroaniline	420	U	440	U	690	U
4-Chlorophenyl-phenylether	420	U	440	U	690	U
4-Methylphenol	420	U	440	U	690	U
4-Nitroaniline	1000	U	1100	U	1700	U
4-Nitrophenol	1000	U	1100	U	1700	U
Acenaphthene	420	U	440	U	690	U
Acenaphthylene	420	U	440	U	690	U
Anthracene	420	U	440	U	690	U
Benzo(a)anthracene	59	J	440	U	690	U
Benzo(a)pyrene	63	J	440	U	690	U
Benzo(b)fluoranthene	58	J	440	U	690	U
Benzo(g,h,i)perylene	420	U	440	U	690	U
Benzo(k)fluoranthene	60	J	440	U	690	U
bis(2-Chloroethoxy)methane	420	U	440	U	690	U
bis(2-Chloroethyl)ether	420	U	440	U	690	U
bis(2-Ethylhexyl)phthalate	2000		440	U	690	U
Butylbenzylphthalate	420	U	440	U	690	U
Carbazole	420	U	440	U	690	U
Chrysene	67	J	440	U	690	U
Di-n-butylphthalate	230	J	440	U	690	U
Di-n-octylphthalate	420	U	440	U	690	U
Dibenz(a,h)anthracene	420	U	440	U	690	U
Dibenzofuran	420	U	440	U	690	U
Diethylphthalate	420	U	440	U	690	U
Dimethylphthalate	420	U	440	U	690	U
Fluoranthene	69	J	440	U	690	U
Fluorene	420	U	440	U	690	U
Hexachlorobenzene	420	U	440	U	690	U
Hexachlorobutadiene	420	U	440	U	690	U
Hexachlorocyclopentadiene	420	U	440	U	690	U
Hexachloroethane	420	U	440	U	690	U
Indeno(1,2,3-cd)pyrene	420	U	440	U	690	U
Isophorone	420	U	440	U	690	U
N-Nitroso-di-n-propylamine	420	U	440	U	690	U
N-Nitrosodiphenylamine (1)	420	U	440	U	690	U
Naphthalene	420	U	440	U	690	U
Nitrobenzene	420	U	440	U	690	U
Pentachlorophenol	1000	U	1100	U	1700	U
Phenanthrene	420	U	440	U	690	U
Phenol	420	U	440	U	690	U
Pyrene	42	J	440	U	690	U
Pesticides/PCBs, ug/kg						
4,4'-DDD	4.1	U	4.3	U	6.9	U
4,4'-DDE	4.1	U	4.3	U	6.9	U
4,4'-DDT	4.1	U	4.3	U	6.9	U
Aldrin	2.1	U	2.2	U	3.5	U

Appendix D
Table D-1
Summary of Subsurface Soil Analytical Results
Study Area 45

Naval Training Center, Orlando
Orlando, FL

Sample ID	45B00101		45B00201		45B00301	
Lab ID	MA587002		MA587003		MA587004	
Sampling Date	27-Mar-96		27-Mar-96		27-Mar-96	
alpha-BHC	2.1	U	2.2	U	3.5	U
alpha-Chlordane	2.1	U	2.2	U	3.5	U
Aroclor-1016	41	U	43	U	69	U
Aroclor-1221	84	U	88	U	140	U
Aroclor-1232	41	U	43	U	69	U
Aroclor-1242	41	U	43	U	69	U
Aroclor-1248	41	U	43	U	69	U
Aroclor-1254	41	U	43	U	69	U
Aroclor-1260	41	U	43	U	69	U
beta-BHC	2.1	U	2.2	U	3.5	U
delta-BHC	2.1	U	2.2	U	3.5	U
Dieldrin	4.1	U	4.3	U	6.9	U
Endosulfan I	2.1	U	2.2	U	3.5	U
Endosulfan II	4.1	U	4.3	U	6.9	U
Endosulfan sulfate	4.1	U	4.3	U	6.9	U
Endrin	4.1	U	4.3	U	6.9	U
Endrin aldehyde	4.1	U	4.3	U	6.9	U
Endrin ketone	4.1	U	4.3	U	6.9	U
gamma-BHC (Lindane)	2.1	U	2.2	U	3.5	U
gamma-Chlordane	2.1	U	2.2	U	3.5	U
Heptachlor	2.1	U	2.2	U	3.5	U
Heptachlor epoxide	2.1	U	2.2	U	3.5	U
Methoxychlor	21	U	22	U	35	U
Toxaphene	210	U	220	U	350	U
Inorganics, mg/kg						
Aluminum	593		1840		2120	
Antimony	2.7	UJ	2.8	UJ	2.8	UJ
Arsenic	0.33	UJ	0.34	J	0.39	J
Barium	5.4	J	5.8	J	12.1	J
Beryllium	0.04	U	0.04	U	0.14	B
Cadmium	0.45	U	0.46	U	0.46	U
Calcium	1860	J	4280	J	7070	J
Chromium	1.8	B	1.5	B	2.5	B
Cobalt	0.38	UJ	0.38	UJ	0.38	UJ
Copper	4.6	B	1.7	B	3.1	B
Iron	72.3		325		75.9	
Lead	4	J	3.7	J	4.5	J
Magnesium	63.2	B	42.4	B	101	B
Manganese	7.1		2.6	B	1.8	B
Mercury	0.04	UJ	0.04	UJ	0.04	UJ
Nickel	4.1	B	1.9	U	1.9	U
Potassium	192	U	194	U	194	U
Selenium	0.33	U	0.69	J	1.4	
Silver	0.55	U	0.56	U	0.56	U
Sodium	31.5	U	32.5	U	27.9	U
Thallium	0.22	U	0.22	U	0.22	U
Vanadium	1	B	2.4	B	7.9	B
Zinc	5.1	U	4.1	U	6.3	U

APPENDIX D-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Appendix D
Table D-2
Summary of Groundwater Analytical Results
Study Area 45

Naval Training Center, Orlando
Orlando, FL

Sample ID	45G00101		45H00101	45G00201		45H00201	45G00301		45H00301
Lab ID	MA598002		MA598003	MA598004		MA598005	MA598006		MA598007
Sampling Date	28-Mar-96		28-Mar-96	28-Mar-96		28-Mar-96	28-Mar-96		28-Mar-96
Volatile organics, ug/L									
1,1,1-Trichloroethane	2	U	NA	1	U	NA	2	U	NA
1,1,2,2-Tetrachloroethane	2	U	NA	1	U	NA	2	U	NA
1,1,2-Trichloroethane	2	U	NA	1	U	NA	2	U	NA
1,1-Dichloroethane	2	U	NA	1	U	NA	2	U	NA
1,1-Dichloroethene	2	U	NA	1	U	NA	2	U	NA
1,2-Dibromo-3-chloropropane	2	U	NA	1	U	NA	2	U	NA
1,2-Dibromoethane	2	U	NA	1	U	NA	2	U	NA
1,2-Dichloroethane	2	U	NA	1	U	NA	2	U	NA
1,2-Dichloropropane	2	U	NA	1	U	NA	2	U	NA
2-Butanone	12	UR	NA	5	UR	NA	12	UR	NA
2-Hexanone	12	U	NA	5	U	NA	12	U	NA
4-Methyl-2-pentanone	12	U	NA	5	U	NA	12	U	NA
Acetone	8	R	NA	3	R	NA	8	R	NA
Benzene	2	U	NA	1	U	NA	2	U	NA
Bromochloromethane	2	U	NA	1	U	NA	2	U	NA
Bromodichloromethane	2	U	NA	1	U	NA	2	U	NA
Bromoform	2	U	NA	1	U	NA	2	U	NA
Bromomethane	2	J	NA	1	U	NA	2	U	NA
Carbon disulfide	2	U	NA	1	U	NA	2	U	NA
Carbon tetrachloride	2	U	NA	1	U	NA	2	U	NA
Chlorobenzene	2	U	NA	1	U	NA	2	U	NA
Chloroethane	2	U	NA	1	U	NA	2	U	NA
Chloroform	2	U	NA	1	U	NA	2	U	NA
Chloromethane	2	U	NA	1	U	NA	2	U	NA
cis-1,2-Dichloroethene	2	U	NA	1	U	NA	2	U	NA
cis-1,3-Dichloropropene	2	U	NA	1	U	NA	2	U	NA
Dibromochloromethane	2	U	NA	1	U	NA	2	U	NA
Ethylbenzene	2	U	NA	1	U	NA	2	U	NA
Methylene chloride	5	U	NA	2	U	NA	5	U	NA
Styrene	2	U	NA	1	U	NA	2	U	NA
Tetrachloroethene	2	U	NA	1	U	NA	2	U	NA
Toluene	2	U	NA	1	U	NA	2	U	NA
trans-1,2-Dichloroethene	2	U	NA	1	U	NA	2	U	NA
trans-1,3-Dichloropropene	2	U	NA	1	U	NA	2	U	NA
Trichloroethene	2	U	NA	1	U	NA	2	U	NA
Vinyl chloride	2	U	NA	1	U	NA	2	U	NA
Xylene (total)	2	U	NA	1	U	NA	2	U	NA
Semivolatile organics, ug/L									
1,2,4-Trichlorobenzene	10	U	NA	10	U	NA	10	U	NA
1,2-Dichlorobenzene	2	U	NA	1	U	NA	2	U	NA
1,3-Dichlorobenzene	2	U	NA	1	U	NA	2	U	NA
1,4-Dichlorobenzene	2	U	NA	1	U	NA	2	U	NA
2,2'-oxybis(1-Chloropropane)	10	U	NA	10	U	NA	10	U	NA
2,4,5-Trichlorophenol	25	U	NA	25	U	NA	25	U	NA
2,4,6-Trichlorophenol	10	U	NA	10	U	NA	10	U	NA
2,4-Dichlorophenol	10	U	NA	10	U	NA	10	U	NA
2,4-Dimethylphenol	10	U	NA	10	U	NA	10	U	NA
2,4-Dinitrophenol	25	U	NA	25	U	NA	25	U	NA
2,4-Dinitrotoluene	10	U	NA	10	U	NA	10	U	NA

Appendix D
Table D-2
Summary of Groundwater Analytical Results
Study Area 45

Naval Training Center, Orlando
Orlando, FL

Sample ID	45G00101		45H00101		45G00201		45H00201		45G00301		45H00301	
Lab ID	MA598002		MA598003		MA598004		MA598005		MA598006		MA598007	
Sampling Date	28-Mar-96		28-Mar-96		28-Mar-96		28-Mar-96		28-Mar-96		28-Mar-96	
2,6-Dinitrotoluene	10	U	NA		10	U	NA		10	U	NA	
2-Chloronaphthalene	10	U	NA		10	U	NA		10	U	NA	
2-Chlorophenol	10	U	NA		10	U	NA		10	U	NA	
2-Methylnaphthalene	10	U	NA		10	U	NA		10	U	NA	
2-Methylphenol	10	U	NA		10	U	NA		10	U	NA	
2-Nitroaniline	25	U	NA		25	U	NA		25	U	NA	
2-Nitrophenol	10	U	NA		10	U	NA		10	U	NA	
3,3'-Dichlorobenzidine	10	U	NA		10	U	NA		10	U	NA	
3-Nitroaniline	25	U	NA		25	U	NA		25	U	NA	
4,6-Dinitro-2-methylphenol	25	U	NA		25	U	NA		25	U	NA	
4-Bromophenyl-phenylether	10	U	NA		10	U	NA		10	U	NA	
4-Chloro-3-methylphenol	10	U	NA		10	U	NA		10	U	NA	
4-Chloroaniline	10	U	NA		10	U	NA		10	U	NA	
4-Chlorophenyl-phenylether	10	U	NA		10	U	NA		10	U	NA	
4-Methylphenol	10	U	NA		10	U	NA		10	U	NA	
4-Nitroaniline	25	U	NA		25	U	NA		25	U	NA	
4-Nitrophenol	25	U	NA		25	U	NA		25	U	NA	
Acenaphthene	10	U	NA		10	U	NA		10	U	NA	
Acenaphthylene	10	U	NA		10	U	NA		10	U	NA	
Anthracene	10	U	NA		10	U	NA		10	U	NA	
Benzo(a)anthracene	10	U	NA		10	U	NA		10	U	NA	
Benzo(a)pyrene	10	U	NA		10	U	NA		10	U	NA	
Benzo(b)fluoranthene	10	U	NA		10	U	NA		10	U	NA	
Benzo(g,h,i)perylene	10	U	NA		10	U	NA		10	U	NA	
Benzo(k)fluoranthene	10	U	NA		10	U	NA		10	U	NA	
bis(2-Chloroethoxy)methane	10	U	NA		10	U	NA		10	U	NA	
bis(2-Chloroethyl)ether	10	U	NA		10	U	NA		10	U	NA	
bis(2-Ethylhexyl)phthalate	10	U	NA		10	U	NA		10	U	NA	
Butylbenzylphthalate	10	U	NA		10	U	NA		10	U	NA	
Carbazole	10	U	NA		10	U	NA		10	U	NA	
Chrysene	10	U	NA		10	U	NA		10	U	NA	
Di-n-butylphthalate	10	U	NA		10	U	NA		10	U	NA	
Di-n-octylphthalate	10	U	NA		10	U	NA		10	U	NA	
Dibenz(a,h)anthracene	10	U	NA		10	U	NA		10	U	NA	
Dibenzofuran	10	U	NA		10	U	NA		10	U	NA	
Diethylphthalate	10	U	NA		10	U	NA		10	U	NA	
Dimethylphthalate	10	U	NA		10	U	NA		10	U	NA	
Fluoranthene	10	U	NA		10	U	NA		10	U	NA	
Fluorene	10	U	NA		10	U	NA		10	U	NA	
Hexachlorobenzene	10	U	NA		10	U	NA		10	U	NA	
Hexachlorobutadiene	10	U	NA		10	U	NA		10	U	NA	
Hexachlorocyclopentadiene	10	U	NA		10	U	NA		10	U	NA	
Hexachloroethane	10	U	NA		10	U	NA		10	U	NA	
Indeno(1,2,3-cd)pyrene	10	U	NA		10	U	NA		10	U	NA	
Isophorone	10	U	NA		10	U	NA		10	U	NA	
N-Nitroso-di-n-propylamine	10	U	NA		10	U	NA		10	U	NA	
N-Nitrosodiphenylamine (1)	10	U	NA		10	U	NA		10	U	NA	
Naphthalene	10	U	NA		10	U	NA		10	U	NA	
Nitrobenzene	10	U	NA		10	U	NA		10	U	NA	
Pentachlorophenol	25	U	NA		25	U	NA		25	U	NA	

Appendix D
Table D-2
Summary of Groundwater Analytical Results
Study Area 45

Naval Training Center, Orlando
Orlando, FL

Sample ID	45G00101		45H00101		45G00201		45H00201		45G00301		45H00301	
Lab ID	MA598002		MA598003		MA598004		MA598005		MA598006		MA598007	
Sampling Date	28-Mar-96		28-Mar-96		28-Mar-96		28-Mar-96		28-Mar-96		28-Mar-96	
Phenanthrene	10	U	NA		10	U	NA		10	U	NA	
Phenol	10	U	NA		10	U	NA		10	U	NA	
Pyrene	10	U	NA		10	U	NA		10	U	NA	
Pesticides/PCBs, ug/L												
4,4'-DDD	0.1	U	NA		0.1	U	NA		0.1	U	NA	
4,4'-DDE	0.1	U	NA		0.1	U	NA		0.1	U	NA	
4,4'-DDT	0.1	U	NA		0.1	U	NA		0.1	U	NA	
Aldrin	0.05	U	NA		0.05	U	NA		0.05	U	NA	
alpha-BHC	0.05	UJ	NA		0.05	UJ	NA		0.05	UJ	NA	
alpha-Chlordane	0.05	U	NA		0.05	U	NA		0.05	U	NA	
Aroclor-1016	0.5	U	NA		0.5	U	NA		0.5	U	NA	
Aroclor-1221	0.5	U	NA		0.5	U	NA		0.5	U	NA	
Aroclor-1232	0.5	U	NA		0.5	U	NA		0.5	U	NA	
Aroclor-1242	0.5	U	NA		0.5	U	NA		0.5	U	NA	
Aroclor-1248	0.5	U	NA		0.5	U	NA		0.5	U	NA	
Aroclor-1254	0.5	U	NA		0.5	U	NA		0.5	U	NA	
Aroclor-1260	0.5	U	NA		0.5	U	NA		0.5	U	NA	
beta-BHC	0.05	U	NA		0.05	U	NA		0.05	U	NA	
delta-BHC	0.05	U	NA		0.05	U	NA		0.05	U	NA	
Dieldrin	0.1	U	NA		0.1	U	NA		0.1	U	NA	
Endosulfan I	0.05	U	NA		0.05	U	NA		0.05	U	NA	
Endosulfan II	0.1	U	NA		0.1	U	NA		0.1	U	NA	
Endosulfan sulfate	0.1	U	NA		0.1	U	NA		0.1	U	NA	
Endrin	0.1	U	NA		0.1	U	NA		0.1	U	NA	
Endrin aldehyde	0.1	U	NA		0.1	U	NA		0.1	U	NA	
Endrin ketone	0.1	U	NA		0.1	U	NA		0.1	U	NA	
gamma-BHC (Lindane)	0.05	U	NA		0.05	U	NA		0.05	U	NA	
gamma-Chlordane	0.05	U	NA		0.05	U	NA		0.05	U	NA	
Heptachlor	0.05	U	NA		0.05	U	NA		0.05	U	NA	
Heptachlor epoxide	0.05	U	NA		0.05	U	NA		0.05	U	NA	
Methoxychlor	0.5	UJ	NA		0.5	UJ	NA		0.5	UJ	NA	
Toxaphene	5	U	NA		5	U	NA		5	U	NA	
Inorganics, ug/L												
Aluminum	204	J	194	J	6620	J	1610	J	566	J	568	J
Antimony	5.5	U	5.6		1.6	U	1.1	U	4.4	U	5.4	U
Arsenic	1.3	U	1.3	U	1.3	U	1.3	U	2.4	B	3	B
Barium	43.1	J	40.2	J	36.5	J	34.2	J	18.5	U	18.1	U
Beryllium	0.2	U	0.2	U	0.29	B	0.2	U	0.2	U	0.2	U
Cadmium	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ
Calcium	283000		280000		75200		89900		60700		59500	
Chromium	2.2	U	2.2	U	6.1	U	2.2	U	2.2	U	2.2	U
Cobalt	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
Copper	2	UJ	2.1	J	2	UJ	2	UJ	2	U	2	UJ
Iron	51.2	U	37.3	U	293	J	200	J	32.3	U	22.9	U
Lead	2.5	UJ	1.2	UJ	2	J	1.2	UJ	2.4	J	1.2	UJ
Magnesium	12600		12500		2210	B	2950	B	3530	B	3490	B
Manganese	285	J	279	J	14.8	J	18.8	J	14.2	J	14.1	J
Mercury	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
Nickel	7.7	U	7.7	U	7.7	U	7.7	U	7.7	U	7.7	U
Potassium	1580	B	1890	B	767	U	767	U	2990	B	2530	B

Appendix D
Table D-2
Summary of Groundwater Analytical Results
Study Area 45

Naval Training Center, Orlando
Orlando, FL

Sample ID	45G00101		45H00101		45G00201		45H00201		45G00301		45H00301	
Lab ID	MA598002		MA598003		MA598004		MA598005		MA598006		MA598007	
Sampling Date	28-Mar-96		28-Mar-96		28-Mar-96		28-Mar-96		28-Mar-96		28-Mar-96	
Selenium	1.3	U	1.3	U	1.4	B	1.3	U	1.3	U	1.3	UJ
Silver	2.2	UJ	2.2	UJ	2.2	UJ	2.2	UJ	2.2	UJ	2.2	U
Sodium	6100	J	6040	J	1610	J	1900	J	1710	J	1800	J
Thallium	0.86	UJ	0.86	UJ	0.86	U	0.86	U	0.86	UJ	0.86	UJ
Vanadium	3.4	B	5.2	B	3.6	B	1.6	U	7.9	B	5.5	B
Zinc	20.2	U	16.3	U	24.3	U	21.7	U	8.2	U	8.5	U
General Chemistry, mg/L												
Total Suspended Solids	5		NA		86		NA		10		NA	

Notes for Analytical Results
Tables
Study Area 45

Naval Training Center, Orlando
Orlando, FL

NOTES:

[1] The background screening value is twice the average of detected concentrations for inorganic analytes. For organics, values are the mean of detected concentration, presented for comparison purposes only.

[2] SCG = Soil Cleanup Goals for Florida (Florida Department of Environmental Protection memorandum, September 29, 1995). Values indicated are from a residential scenario. Chromium values are for Chromium VI.

[3] RBC = Risk-Based Concentration Table, USEPA Region III, October, 1995, R.L. Smith. RBC for chromium is based on chromium VI. RBC for lead is not available, value is Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER directive 9355-4-12). For essential nutrients (calcium, magnesium, potassium, and sodium) screening values were derived based on recommended daily allowances (RDAs). RBC for Aroclor-1260 is not available, value is RBC for PCBs. RBC for benzo(g,h,i)perylene and phenanthrene are not available, value is based on pyrene. RBC for thallium is based on thallium chloride. RBC for alpha and gamma-chlordane are based on chlordane.

n = noncarcinogenic pathway
c = carcinogenic pathway
ND = Not determined.
bls = below land surface
D = Indicates value was determined during a diluted reanalysis.
ug/kg = micrograms per kilogram.
N = Indicates presumptive evidence of the compound.
J = Reported concentration is an estimated quantity.
PCB = polychlorinated biphenyl.
USEPA = U.S. Environmental Protection Agency.
mg/kg = milligrams per kilogram.
OSWER = Office of Solid Waste and Emergency Response.
B = Reported concentration is between the instrument detection limit (IDL) and Contract Required Detection Limit (CRDL).
-- = Analyte/compound not detected at reporting limit.

Bold/shaded values indicate exceedance of regulatory guidance and background.
All inorganics results expressed in milligrams per kilogram (mg/kg) soil dry weight; organics in micrograms per kilogram (mg/kg) soil dry weight.
Blank space indicates analyte/compound was not detected at the reporting limit.